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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/079,923	02/20/2002	Victor Firoiu	2204/C23	6488

34845 7590 12/13/2005

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EXAMINER	
ADHAMI, MOHAMMAD SAJID	
ART UNIT	PAPER NUMBER
2662	

DATE MAILED: 12/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/079,923	FIROIU ET AL.	
	Examiner	Art Unit	
	Mohammad S. Adhami	2662	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 November 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-43* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8,10-23,25-38 and 40-43* is/are rejected.

7)☒ Claim(s) *9,24 and 39* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 October 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1,2,4,6-8,10, and 11 is rejected under 35 U.S.C. 102(e) as being anticipated by Gracon (US App. 2002/0110134).

Re claim 1:

Gracon discloses "determining a level of congestion at an output queue" (Paragraph [0045] "The RED process calculates the average queue size" where the level of congestion is based on the queue size (Q_avg)).

Gracon further discloses "determining an ingress forwarding scheme for forwarding information to the output queue based upon the level of congestion at the output queue" (Paragraph [0045] "If the Q_avg is somewhere between MinTh and MaxTh, a packet drop probability (Pb) is calculated" where the packet drop probability is "an ingress forwarding scheme" and Q_avg is used for "the level of congestion at the output queue").

Gracon further discloses "forwarding information to the output queue based upon the ingress forwarding scheme" (Paragraph [0045] "A packet is

randomly dropped based on the calculated Pb" where the "ingress forwarding scheme" forwards information that is not dropped to the output queue).

Re claim 2:

Gracon discloses "collecting congestion information for the output queue" and "computing a running time average of the output queue size" (Paragraph [0045] "The RED process calculates the average queue size" where the level of congestion is based on the queue size (Q_avg) where the queue size is "congestion information").

Gracon further discloses "deriving a drop probability for the output queue based upon the running time average of the output queue size" (Paragraph [0045] "The Pb is a function of...the difference between the Q_avg and the MinTh" where Pb is the "drop probability" and Q_avg is the "running time average of the output queue size").

Re claim 4:

Gracon discloses "determining an ingress drop probability for dropping information destined for the output queue based upon the level of congestion at the output queue" (Paragraph [0045] "The Pb is a function of...the difference between the Q_avg and the MinTh" where Pb is the "drop probability" and Q_avg is the average queue size, where the level of congestion is based on the queue size).

Re claim 6:

Gracon discloses "maintaining a step number for the output queue, the step number indicating an ingress drop probability level having a corresponding ingress drop probability" (Paragraph [0047] "five congestion regions are separated by four programmable levels...Each level represents a predetermined queue size" where the levels are "step numbers" and it has previously been established that queue size determines the "ingress drop probability").

Gracon further discloses "initializing the step number for the output queue to a predetermined initial step number" (Paragraph [0047] "all packets received when the NQ size is less than the Pass_level are passed" where NQ size is the instantaneous queue size and "the step number" is initialized to Pass_level because at initialization the queue size is zero).

Gracon further discloses "setting the ingress drop probability for the input queue equal to an ingress drop probability corresponding to the initial step number" (Paragraph [0047] "all packets received when the NQ size is less than the Pass_level are passed" where the "ingress drop probability" corresponding to the Pass_level is zero).

Gracon further discloses "monitoring changes in the level of congestion at the output queue" (Changes in the level of congestion will be monitored because an instantaneous queue size is used, see Paragraph [0046] "instantaneous queues size (NQ_size)").

Gracon further discloses "incrementing the step number for the output queue and setting the ingress drop probability for the input queue equal to an ingress drop probability corresponding to the incremented step number, if the level of congestion at the output queue is greater than a first predetermined threshold" (Paragraph [0047] "five congestion regions are separated by four programmable levels…Each level represents a predetermined queue size" where the levels are "step numbers" so as the queue size increases, the step number increases and Paragraph [0048] "If the NQ_size is greater than the Pass_level, a probability of dropping a red packet (P_red) is determined" where red is the next "step number" and the Pass_level is the "first predetermined threshold").

Gracon further discloses "decrementing the step number for the output queue and setting the ingress drop probability for the input queue equal to an ingress drop probability corresponding to the decremented step number, if the level of congestion at the output queue is less than a second predetermined threshold" (Because the step number is based on the queue size, when the queue decreases, it will automatically drop the step number to one that corresponds to the new queue size).

Re claim 7:

Gracon discloses "wherein the step number for the output queue is maintained at the ingress port" (The step number is determined at the congestion manager (reference 204 of Figure 2) which is located in packet scheduler 106 of Figure 1 at the "ingress port", so the step number is maintained there.).

Re claim 8:

Gracon discloses “wherein the step number for the output queue is maintained at the output queue” (The step number is determined at the congestion manager (reference 204 of Figure 2) which is located in packet scheduler 122 of Figure 1 at the “output queue”, so the step number is maintained there.).

Re claims 10 and 11:

Gracon discloses “determining that the level of congestion at the output queue has increased; and increasing the ingress drop probability” and “determining that the level of congestion at the output queue has decreases; and decreasing the ingress drop probability” (Paragraph [0045] “The Pb is a function of…the difference between Q_avg and the MinTh” where Pb is the “ingress drop probability” Q_avg is the average queue size, which determines the level of congestion, and Figure 5 where the “level of congestion” is shown to have a linear relationship with “the ingress drop probability”. At T1, the “level of congestion is low” so the drop probability is 0, but at T5 the “level of congestion” is high” so the drop probability is 1).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gracon in view of Cloonan (US App. 2002/0009051).

Re claim 3:

As discussed above, Gracon meets the limitations of the parent claim.

Gracon does not explicitly disclose "monitoring an input data rate to the output queue; and monitoring an output data rate from the output queue."

Cloonan discloses "monitoring an input data rate to the output queue; and monitoring an output data rate from the output queue" **(**Paragraph [0028] "The data throughput monitor (220) has the task of determining the rate of data packet flow" and Figure 2 references 220 and 225 where there is a monitor for the input and output**)**.

Gracon and Cloonan are analogous because they both pertain to transmitting data packets.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Gracon as discussed above as taught by Cloonan in order to accurately measure traffic flow and congestion of the output queue.

5. Claims 5,12, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gracon in view of Bonneau (US 6,671,258).

Re claims 5,12, and 13:

As discussed above, Gracon meets all the limitations of the parent claim.

Gracon does not explicitly disclose "determining a forwarding rate for forwarding information to the output queue based upon the level of congestion at the output queue" and "determining that the level of congestion at the output queue has increased; and decreasing the forwarding rate" and "determining that the level of congestion at the output queue has decreased; and increasing the forwarding rate."

Bonneau (**Re claim 5**) discloses "determining a forwarding rate for forwarding information to the output queue based upon the level of congestion at the output queue" **(**Col.2 lines 30-32 "TCP is an adaptive flow because the packet transmission rate for any given flow depends on its congestion"**)**.

Bonneau further (**Re claim 12**) discloses "determining that the level of congestion at the output queue has increased; and decreasing the forwarding rate" and (**Re claim 13**) "determining that the level of congestion at the output queue has decreased; and increasing the forwarding rate" **(**As shown above, the transmission rate is adaptive and depends on the congestion, so if congestion increases the flow rate will decrease and if congestion decreases the flow rate will increase. The Abstract shows this relationship with "TCP flows which decrease their transmission rates in response to congestion"**)**.

Gracon and Bonneau are analogous because they both pertain to queuing data packets.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Gracon as discussed above as taught by Bonneau in order to prevent overflow and packet loss.

6. Claims 14,15, 17-19,21-23,25,26,29,30,32-34,36-38,40, and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gracon in view of Barri (US 6,657,962).

Re claims 14 and 29:

Gracon discloses "egress logic operably coupled to maintain an output queue and determine a level of congestion at the output queue" (Figure 1 reference 122, where the packet scheduler has a congestion manager as shown in Figure 2 reference 204 that maintains an output queue).

Gracon further discloses "ingress logic operably coupled to control the rate at which information is forwarded to...[an] output queue using an ingress forwarding scheme that is based upon the level of congestion at...[an] output queue" (Figure 1 reference 106 and Paragraph [0022] "The packet scheduler...sends instructions to the packet manager...to either drop a packet, due to policing or congestion, or send a packet according to a schedule" where the "rate at which information is forwarded" is dependent on how many packets are dropped and the "ingress forwarding scheme" is the probability of dropping a packet, all of which occur in the packet scheduler).

Gracon does not explicitly disclose “ingress logic” controlling the rate at which information is forwarded to “the output queue” based upon the level of congestion at the output queue maintained by the egress.

Barri discloses “ingress logic” controlling the rate at which information is forwarded to “the output queue” (A Per Flow Background Update, as shown in Figure 2 reference number 114, “periodically...calculates drop probabilities” (Col.7 lines 26 and 27) for the output queue, where information about the output queue is sent from the “egress logic” to the “ingress logic” as shown in Figure 2 by the link between the ingress logic and egress logic).

Gracon and Barri are analogous because they both pertain to congestion management.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Gracon as discussed above as taught by Barri in order to more efficiently control traffic flow between the ingress and egress of a system.

Re claims 15 and 30:

Gracon discloses “collecting congestion information for the output queue” and “computing a running time average of the output queue size” (Paragraph [0045] “The RED process calculates the average queue size” where the level of congestion is based on the queue size (Q_avg) where the queue size is “congestion information”).

Gracon further discloses “deriving a drop probability for the output queue based upon the running time average of the output queue size” (Paragraph

[0045] "The Pb is a function of...the difference between the Q_avg and the MinTh" where Pb is the "drop probability" and Q_avg is the "running time average of the output queue size").

Re claims 17 and 32:

As discussed above, Gracon meets all the limitations of the parent claim.

Gracon does not explicitly disclose "wherein the ingress logic is operably coupled to determine the ingress forwarding scheme based upon output queue congestion information provided by the egress logic."

Barri discloses "wherein the ingress logic is operably coupled to determine the ingress forwarding scheme based upon output queue congestion information provided by the egress logic" (A Per Flow Background Update, as shown in Figure 2 reference number 114, "periodically...calculates drop probabilities" (Col.7 lines 26 and 27) for the output queue, where dropping packets with a drop probability is an "ingress forwarding scheme" and where congestion information about the output queue is sent from the "egress logic" to the "ingress logic" as shown in Figure 2 by the link between the ingress logic and egress logic).

Gracon and Barri are analogous because they both pertain to congestion management.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Gracon as discussed above as taught by Barri in order to more efficiently control traffic flow.

Re claims 18 and 33:

As discussed above, Gracon meets all the limitations of the parent claim.

Gracon does not explicitly disclose "wherein the egress logic is operably coupled to determine the ingress forwarding scheme and provide the ingress forwarding scheme to the ingress logic."

Barri discloses "wherein the egress logic is operably coupled to determine the ingress forwarding scheme and provide the ingress forwarding scheme to the ingress logic" (Col.5 lines 22-26 "The basic logical tasks of the egress system 106 comprise...calculation of transmit probabilities" and Col.6 lines 15-18 "the ingress system 102 receives several congestion indicators as input. Based on these congestion indicators, based on programmable probabilities" and Figure 2 where a link that "provides the ingress forwarding scheme to the ingress logic" is shown between reference numbers 106 and 102).

Gracon and Barri are analogous because they both pertain to congestion management.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Gracon as discussed above as taught by Barri in order to more efficiently control congestion problems.

Re claims 19 and 34:

Gracon discloses "wherein the ingress logic is operably coupled to drop information destined for the output with an ingress drop probability that is determined based upon the level of congestion at the output queue" (Paragraph

[0045] "A packet is randomly dropped based on the calculated Pb" where it has been established above that Pb is based on the "level of congestion").

Re claims 21 and 36:

Gracon discloses "maintaining a step number for the output queue, the step number indicating an ingress drop probability level having a corresponding ingress drop probability" (Paragraph [0047] "five congestion regions are separated by four programmable levels...Each level represents a predetermined queue size" where the levels are "step numbers" and it has previously been established that queue size determines the "ingress drop probability").

Gracon further discloses "initializing the step number for the output queue to a predetermined initial step number" (Paragraph [0047] "all packets received when the NQ size is less than the Pass_level are passed" where NQ size is the instantaneous queue size and "the step number" is initialized to Pass_level because at initialization the queue size is zero).

Gracon further discloses "setting the ingress drop probability for the input queue equal to an ingress drop probability corresponding to the initial step number" (Paragraph [0047] "all packets received when the NQ size is less than the Pass_level are passed" where the "ingress drop probability" corresponding to the Pass_level is zero).

Gracon further discloses "monitoring changes in the level of congestion at the output queue" (Changes in the level of congestion will be monitored because

an instantaneous queue size is used, see Paragraph [0046] "instantaneous queues size (NQ_size)").

Gracon further discloses "incrementing the step number for the output queue and setting the ingress drop probability for the input queue equal to an ingress drop probability corresponding to the incremented step number, if the level of congestion at the output queue is greater than a first predetermined threshold" (Paragraph [0047] "five congestion regions are separated by four programmable levels...Each level represents a predetermined queue size" where the levels are "step numbers" so as the queue size increases, the step number increases and Paragraph [0048] "If the NQ_size is greater than the Pass_level, a probability of dropping a red packet (P_red) is determined" where red is the next "step number" and the Pass_level is the "first predetermined threshold").

Gracon further discloses "decrementing the step number for the output queue and setting the ingress drop probability for the input queue equal to an ingress drop probability corresponding to the decremented step number, if the level of congestion at the output queue is less than a second predetermined threshold" (Because the step number is based on the queue size, when the queue decreases, it will automatically drop the step number to one that corresponds to the new queue size).

Re claims 22 and 37:

Gracon discloses "wherein the step number for the output queue is maintained or by the ingress logic" (The step number is determined at the

congestion manager (reference 204 of Figure 2) which is located in packet scheduler 106 of Figure 1 by the "ingress logic", so the step number is maintained there.).

Re claims 23 and 38:

Gracon discloses "wherein the step number for the output queue is maintained by the egress logic" (The step number is determined at the congestion manager (reference 204 of Figure 2) which is located in packet scheduler 122 of Figure 1 by the "egress logic", so the step number is maintained there.).

Re claims 25,26,40, and 41:

Gracon discloses "determining that the level of congestion at the output queue has increased; and increasing the ingress drop probability" and "determining that the level of congestion at the output queue has decreases; and decreasing the ingress drop probability" (Paragraph [0045] "The Pb is a function of...the difference between Q_avg and the MinTh" where Pb is the "ingress drop probability" Q_avg is the average queue size, which determines the level of congestion, and Figure 5 where the "level of congestion" is shown to have a linear relationship with "the ingress drop probability". At T1, the "level of congestion is low" so the drop probability is 0, but at T5 the "level of congestion" is high" so the drop probability is 1).

7. Claims 16 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gracon in view of Barri as applied to claim 14 above, and further in view of Cloonan.

Re claims 16 and 31:

As discussed above, Gracon in view of Barri meets the limitations of the parent claim.

Gracon in view of Barri does not explicitly disclose "monitoring an input data rate to the output queue; and monitoring an output data rate from the output queue."

Cloonan discloses "monitoring an input data rate to the output queue; and monitoring an output data rate from the output queue" **(**Paragraph [0028] "The data throughput monitor (220) has the task of determining the rate of data packet flow" and Figure 2 references 220 and 225 where there is a monitor for the input and output**)**.

Gracon, Barri, and Cloonan are analogous because they all pertain to transmitting data packets.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Gracon in view of Barri as discussed above as taught by Cloonan in order to accurately measure traffic flow and congestion of the output queue.

8. Claims 20,27,28,35,42, and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gracon in view of Barri as applied to claim 14 above, and further in view of Bonneau.

Re claims 20,27,28,35,42, and 43:

As discussed above, Gracon in view of Barri meets all the limitations of the parent claim.

Gracon in view of Barri does not explicitly disclose "determining a forwarding rate for forwarding information to the output queue based upon the level of congestion at the output queue" and "determining that the level of congestion at the output queue has increased; and decreasing the forwarding rate" and "determining that the level of congestion at the output queue has decreased; and increasing the forwarding rate."

Bonneau (**Re claims 20 and 35**) discloses "determining a forwarding rate for forwarding information to the output queue based upon the level of congestion at the output queue" (Col.2 lines 30-32 "TCP is an adaptive flow because the packet transmission rate for any given flow depends on its congestion").

Bonneau further (**Re claims 27 and 42**) discloses "determining that the level of congestion at the output queue has increased; and decreasing the forwarding rate" and (**Re claims 28 and 43**) "determining that the level of congestion at the output queue has decreased; and increasing the forwarding rate" (As shown above, the transmission rate is adaptive and depends on the congestion, so if congestion increases the flow rate will decrease and if

congestion decreases the flow rate will increase. The Abstract shows this relationship with "TCP flows which decrease their transmission rates in response to congestion").

Gracon, Barri, and Bonneau are analogous because they all pertain to congestion management.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Gracon in view of Barri as discussed above as taught by Bonneau in order to prevent overflow and packet loss.

Allowable Subject Matter

9. Claims 9,24, and 39 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The prior art of record does not teach or fairly suggest "determining an ingress drop probability for dropping information destined for the output queue based upon the level of congestion at the output queue comprises: determining thresholds T and h; determining a number of ingress drop probability levels n, where: $n = [\log_{(1-T)/(1-h)}(1/N)]$; and determining an ingress drop probability s_n for each ingress drop probability level n, where: $sn = ((1-T)/(1-h))^n$. The prior art of art fails to teach or fairly suggest the formula, $n = [\log_{(1-T)/(1-h)}(1/N)]$, used to determine the ingress drop probability levels and the formula, $sn = ((1-T)/(1-h))^n$, used to determine the ingress drop probability.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Skirmont (US 6,252,848) and Kawarai (US App. 2001/0033581) show calculating a drop probability based on the level of congestion at the output queue. Shao (US App. 2001/0047423) shows changing the flow rate based on congestion. Harrison (US App. 2004/0037223), Calvignae (US App. 2002/0122386) and Dharanikota (US App. 2002/0107908) show providing congestion information from an egress logic to an ingress logic.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mohammad S. Adhami whose telephone number is (571)272-8615. The examiner can normally be reached on Monday-Friday 8-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hassan Kizou can be reached on (571)272-3088. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MSA 12/08/2005

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